XIV. THE OREODONTS OF THE LOWER OLIGOCENE.

By F. B. Loomis.

In 1901 Earl Douglass[1] described a new genus of Oreodonts under the name *Limnenetes*, based on material found in 1899 in the lower Titanothere beds on Thompson Creek, near Three Forks, Montana. He erected two species, *L. platyceps*, based on a skull, and *L.? anceps*, based on a palate, making the former the type of the genus.

A later expedition in 1903 brought to the Museum more material of this same age, especially a skull of *L.? anceps* and limb bones of *L. platyceps*. These specimens, now in the Carnegie Museum, are of especial interest as early and primitive representatives of the large phylum of the *Oreodontidæ*. They have typical oreodont dentitions and skulls, except that, like *Protoreodon*, the orbit is not closed behind, but is confluent with the temporal opening. Through the courtesy of the Carnegie Museum, especially of Mr. O. A. Peterson, I have had the opportunity of studying this material, which should be more fully known, in order that its fundamental position in the phylogeny of the Oreodonts may be better appreciated.

Studying the otic region of these skulls, along with the dentition and general form, it becomes clear that, though similar in form, these two species are early representatives of two lines of Oreodonts, which later diverge widely, *L. platyceps* have the large and inflated bullæ characteristic of *Eucrotaphus* (often called *Eporeodon*) and most of the Miocene representatives of this group; while *L.? anceps* has the tiny bullæ and dental characters of *Merycoidodon* (*Oreodon*). Inasmuch as a study of this family has shown the bulla and its character to be deep-seated and constant, it is necessary to recognize that this latter species is the representative of a separate genus, for which I suggest the name *Oreonetes*.

[1] Trans. Amer. Phil. Soc., Vol. XX, 1901, p. 259.

OREONETES gen. nov.

The genus is based on the species *L.? anceps*, which was founded on a palate, but the skull since found on Big Hole River, north of Dillon, Montana, and numbered 1052 in the Carnegie Museum, gives the characters which make the genus. This genus, I define as an Oreodont with a low, slightly arched, mesocephalic skull; low sagittal and lambdoidal crests, not prolonged behind; with the orbit open behind; light zygomatic arches; tiny bullæ; and very short paroccipital processes. Beside the above characters, which are surely generic, there are certain other features, which may have generic value; but, until more species are found, this is not certain. These features, to which I refer, are the deep, sharply bounded antorbital fossa and the double opening of the infraorbital foramen over the interval between the third and fourth premolars.

In relation to other Oreodonts this genus is closest to *Merycoidodon*, than which it is more primitive, and to which it is apparently ancestral. *Oreonetes* and *Merycoidodon* are the only two genera of the whole phylum which have the tiny bullæ, and *Oreonetes* is its representative in the lower Titanothere beds, *Merycoidodon* appearing in the upper Titanothere beds, and becoming very prolific throughout middle Oligocene times, after which it disappears entirely. What the predecessor of this genus may be is as yet unknown; for *Protoreodon* of the Uinta beds in the late Eocene is not the direct ancestor of this or *Limnenetes*, its feet and dentition being already more specialized than is the case in most of the representatives from the lower Titanothere beds.

The genus *Limnenetes* in the character of the orbit and shape of the skull is similar to *Oreonetes;* but it has the large bullæ, which associate it with *Eucrotaphus*. However the dentition of *Limnenetes* is specialized, and not as primitive as that of most species of *Eucrotaphus;* so that, while this genus is a representative of the early Oreodonts, and still has many primitive features which place it near *Eucrotaphus*, it cannot be considered as the ancestor of such a primitive genus as *Eucrotaphus*. The relationships of these early genera may be expressed by the diagram on the next page (Fig. 1).

These two important species are here more fully illustrated than was done at the time of their first description.

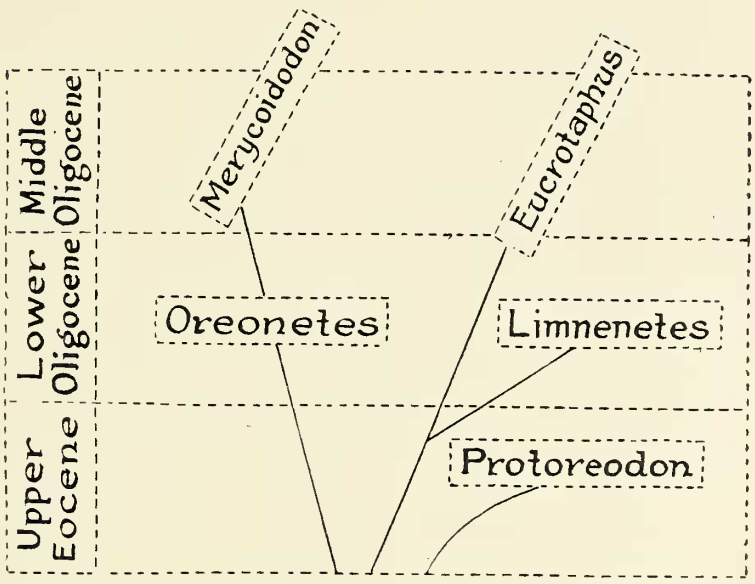


Fig. 1. Diagram showing geological horizons and probable relationships of early Oreodonts.

1. **Limnenetes platyceps** Douglass.

(PLATE LII, figs. 1–3; PLATE LIII, figs. 2–7.)

L. platyceps Douglass, Trans. Amer. Phil. Soc., 1901, Vol. XX, p. 260.

In describing this species and establishing the genus Douglass emphasized the fact that the orbit opens behind, the large bulla, and the free interparietal bone. He saw it was related to *Eucrotaphus* and called it probably ancestral. Unfortunately the type is an old individual, with the teeth excessively worn, so that only their size is distinguishable. Associated material however, gives many characters, not available in the type. The species is easily recognized, when the orbital region is present, by the lack of an antorbital fossa. Among the associated material No. 303 has premolars ^{2} and ^{4} and molar ^{1} of

Fig. 2. *Limnenetes platyceps;* crown view of upper premolars 2–4. No. 303, natural size.

the upper jaw, and No. 1086, though young and having milk premolars, has molars [1] and [2] in place. From these specimens the upper molar characters are deciphered. The molars are low-crowned and similar to those of *Merycoidodon*. Premolar [4] has no pit in the anterior external corner, as do most Oligocene forms. The anterior portion of premolar [3] is simple, having only a trace of the anterior cresecnt on the inner side and no anterior intermediate crest from the primary cusp, as in most Oligocene genera. Premolar[2] is similar, but smaller. These characteristics show that the genus and species is already specialized, and is not the immediate ancestor of *Eucrotaphus*, which has the pit in the anterior external corner of premolar [4] and also the intermediate crest and crescent on the front part of the third upper premolar. In other words, while primitive in the shape of the skull and having the orbit open behind, this genus is specialized in its dentition.

The figures will give most measurements, but the following are characteristic of the teeth:

Upper premolar 2.....	6 mm. long by	4.5 mm.	wide.
Upper premolar 3.....	7 mm. long by	6 mm.	wide.
Upper premolar 4.....	6 mm. long by	6 mm.	wide.
Upper Molar 1.....	11 mm. long by	11 mm.	wide.
Upper Molar 2.....	14 mm. long by	12 mm.	wide.

Several specimens have portions of the limb bones, but No. 1184 has the most, and those figured all belong to that specimen, serving to give an idea of the build of this animal. They are slender and rather long, suggestive of such a form as Peterson[2] has illustrated under *Merychyus*.

The humerus is slender and light of build, with a very high great trochanter and a prominent lesser trochanter. The shaft is slender and more nearly straight than is usual in Oreodonts. The epicondylar pit is deep. In this specimen the radius and ulna are represented by about half their length, but indicate a long fore limb, the ulna having a very long olecranon process, and the radius is considerably flattened, as in *Merychyus*, though not so much so. There is a complete pelvis, which is rather short and widely expanded toward the rear. The femur was long and slender, with the ends enlarged, but the whole bone is not preserved. The tibia is complete, and for an Oreodont

[2] Ann. Carnegie Museum, Vol. XV, 1923, pp. 96–103, Pl. VIII.

decidedly long, but the cnemial crest is short and prominent. One median and a couple of lateral metatarsals show the foot to be distinctly elongated and of the *Merychyus* type. The toes are slender and long with narrow unguals.

2. **Oreonetes anceps** Douglass.

(PLATE LIII, PLATE LIV, figs. 1 and 2.)

Limnenetes? anceps Douglass, Trans. Amer. Phil. Soc., Vol. XX, 1901, p. 262.

Douglass based this species on a palate, which of course did not give the characters mentioned above as characteristic of the genus. No. 1052 is a good skull, found at a later date, and has almost the

Fig. 3. *Oreonetes anceps;* crown view of upper premolars 1–4. No. 1052, nat. size.

same shape and size as *L. platyceps*, though it is slightly longer and slenderer, but the tiny bullæ and the dental characters are entirely distinctive. In front of the orbit there is a large and sharply bounded antorbital fossa, which makes the species easily recognizable. In the upper dentition, premolar ^{4} has the posterior crescent failing to reach the anterior external corner of the tooth, and two small pits there, representing the larger pits on the anterior portion of the premolar farther forward. This form represents a perfect transitional type in the line toward *Merycoidodon*. No. 11,256 is the muzzle of a slightly smaller individual.

Measurements of the skull can be taken from the figures, but the following details of the dentition may be helpful.

Length of the upper premolar series	23 mm.
Length of the upper molar series	26 mm.

Upper premolar 2	6 mm. long by	4.5 mm. wide.
Upper premolar 3	7 mm. long by	6 mm. wide.
Upper premolar 4	5 mm. long by	7.5 mm. wide.
Upper molar 1	8 mm. long by	9.5 mm. wide
Upper molar 2	9 mm. long by	11.5 mm. wide.
Upper molar 3	11 mm. long by	12 mm. wide.

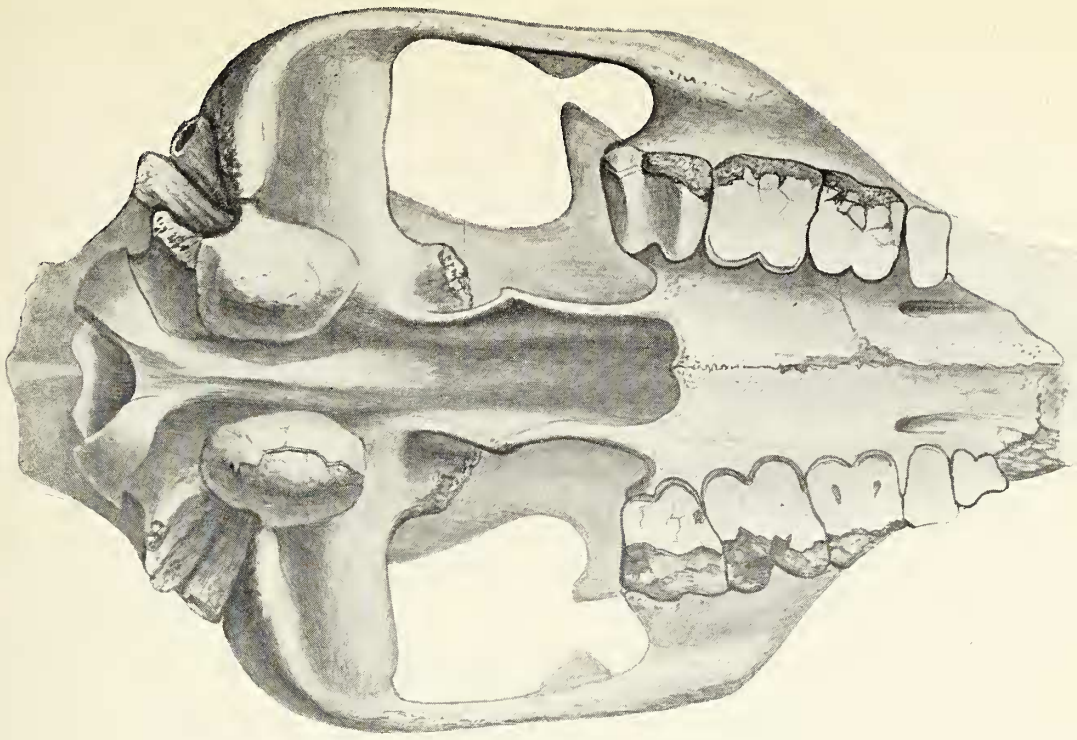
EXPLANATION OF PLATE LII.

Fig. 1. Skull of *Limnenetes platyceps* from below. Type, No. 701; original No. 49.

Fig. 2. Skull of *Limnenetes platyceps* from above. Type, No. 701; original No. 49.

Fig. 3. Left side of pelvis of *Limnenetes platyceps*. No. 1184.

(All figures natural size.)



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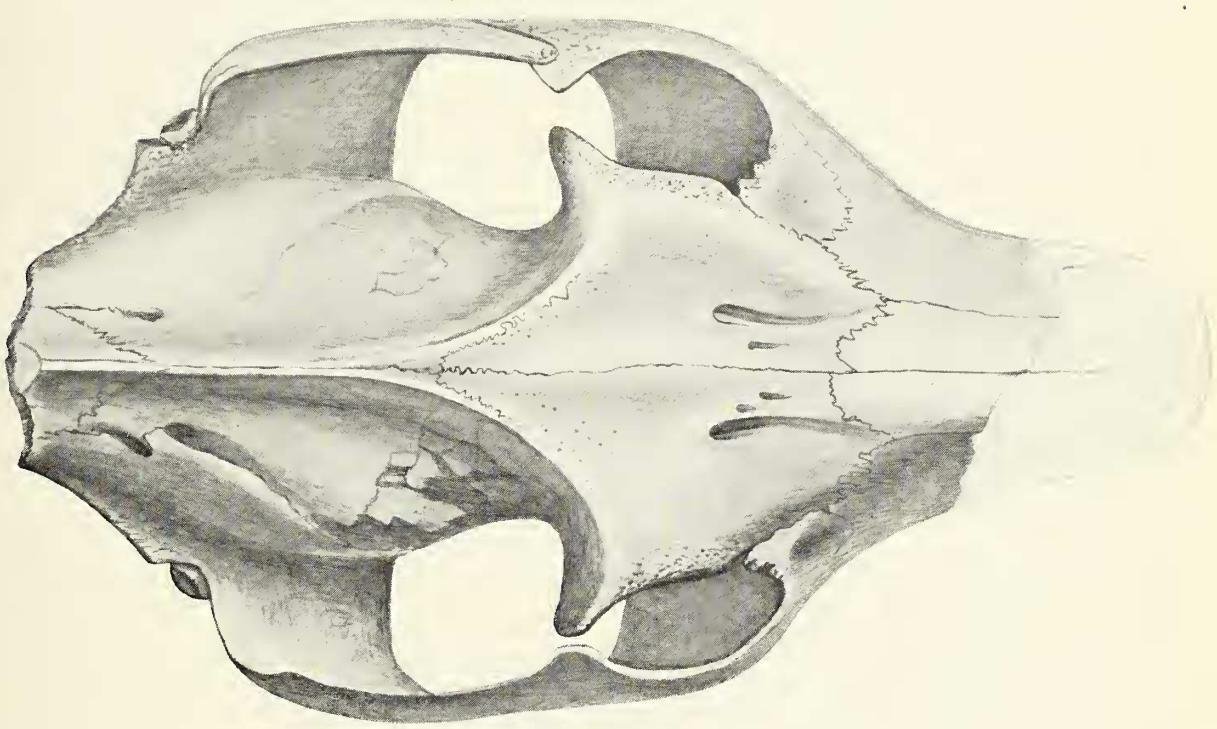

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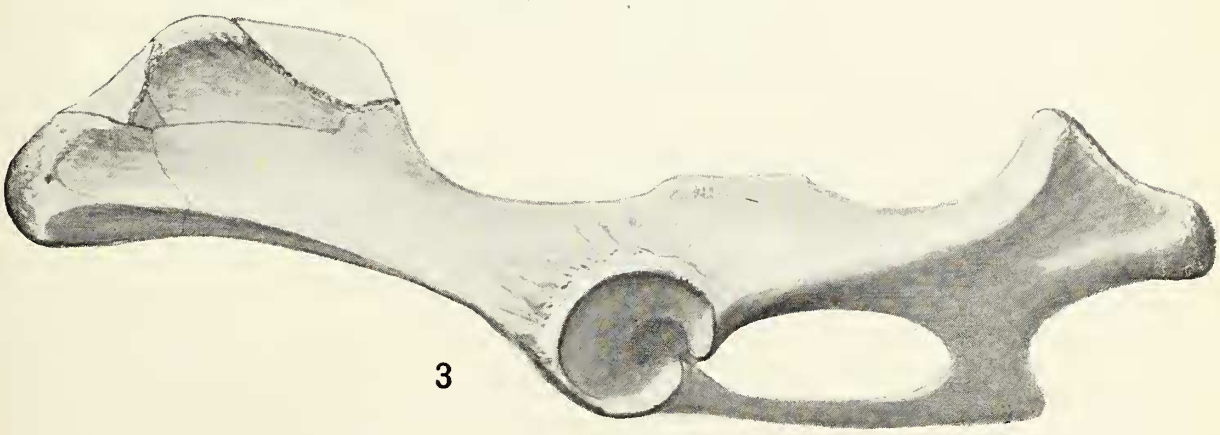

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Limnenetes platyceps Douglass.

EXPLANATION OF PLATE LIII.

Fig. 1. Skull of *Oreonetes anceps* from below. No. 1052.

Fig. 2. Humerus of *Limnenetes platyceps*, posterior view.

Fig. 3. Metatarsal III of *Limnenetes platyceps*, anterior view.

Fig. 4. Humerus of *Limnenetes platyceps*, side view.

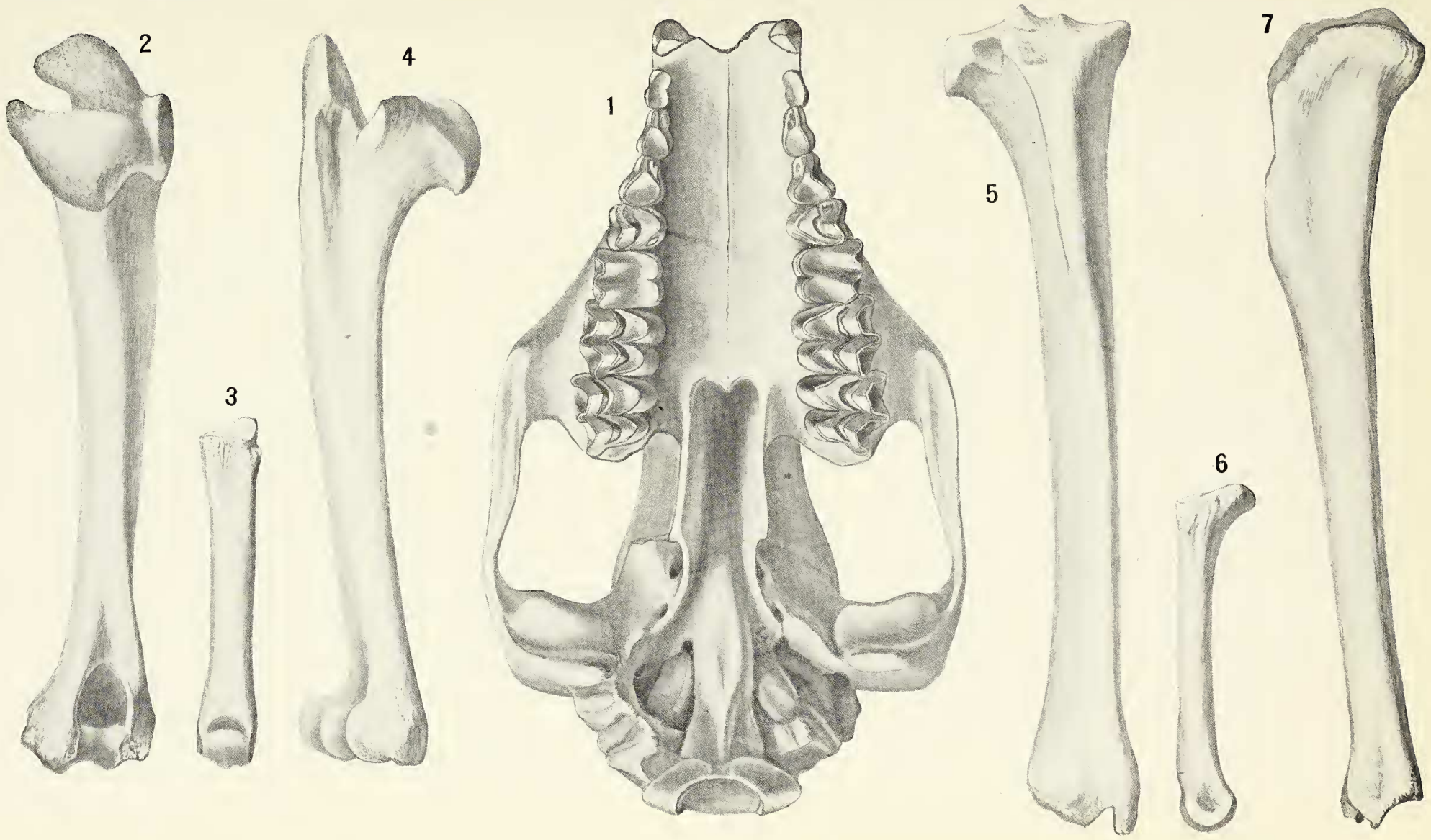
Fig. 5. Tibia of *Limnenetes platyceps*, anterior view.

Fig. 6. Metatarsal III of *Limnenetes platyceps*, side view.

Fig. 7. Tibia of *Limnenetes platyceps*, from the side.

Figs. 2 to 7 are taken from specimen No. 1184.

(All figures natural size.)



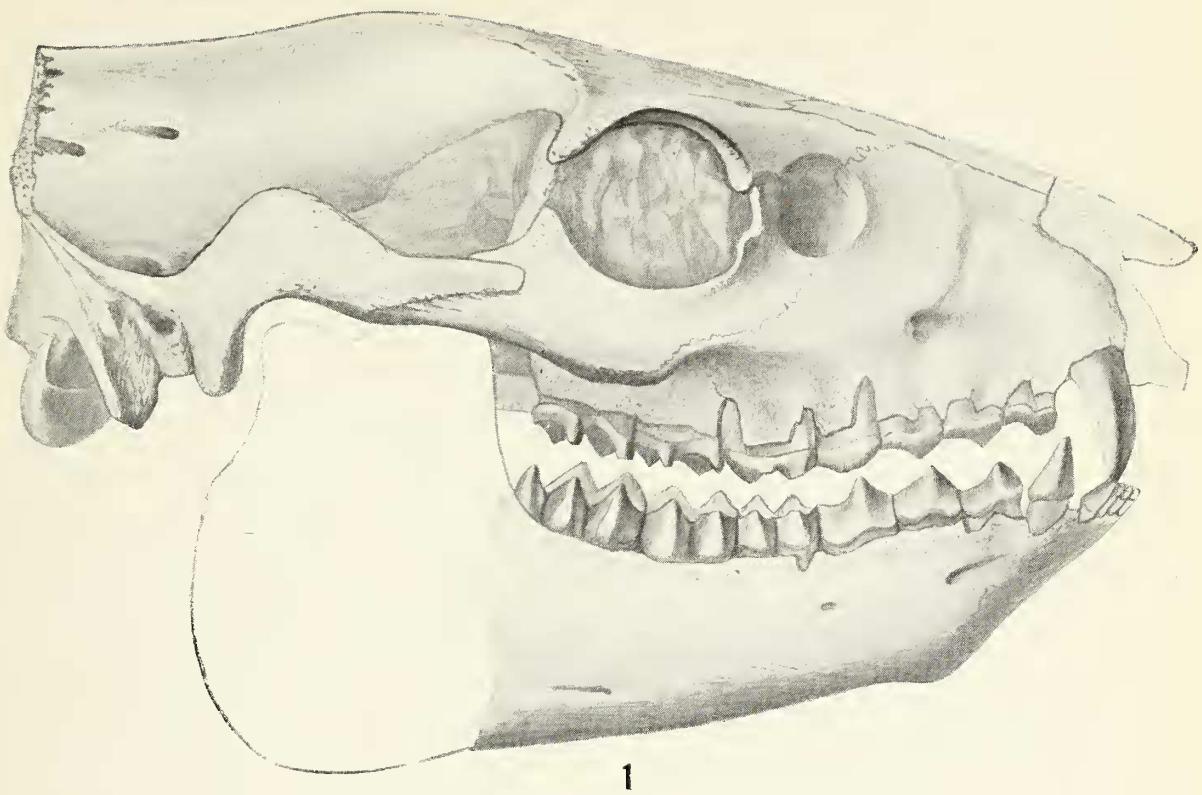
Oreonetes and *Limnenetes*.

EXPLANATION OF PLATE LIV.

Fig. 1. Skull and jaws of *Oreonetes anceps* from the side. No. 1052. Lower jaw, No. 1118.

Fig. 2. Skull of *Oreonetes anceps* from above. No. 1052.

(All figures natural size.)



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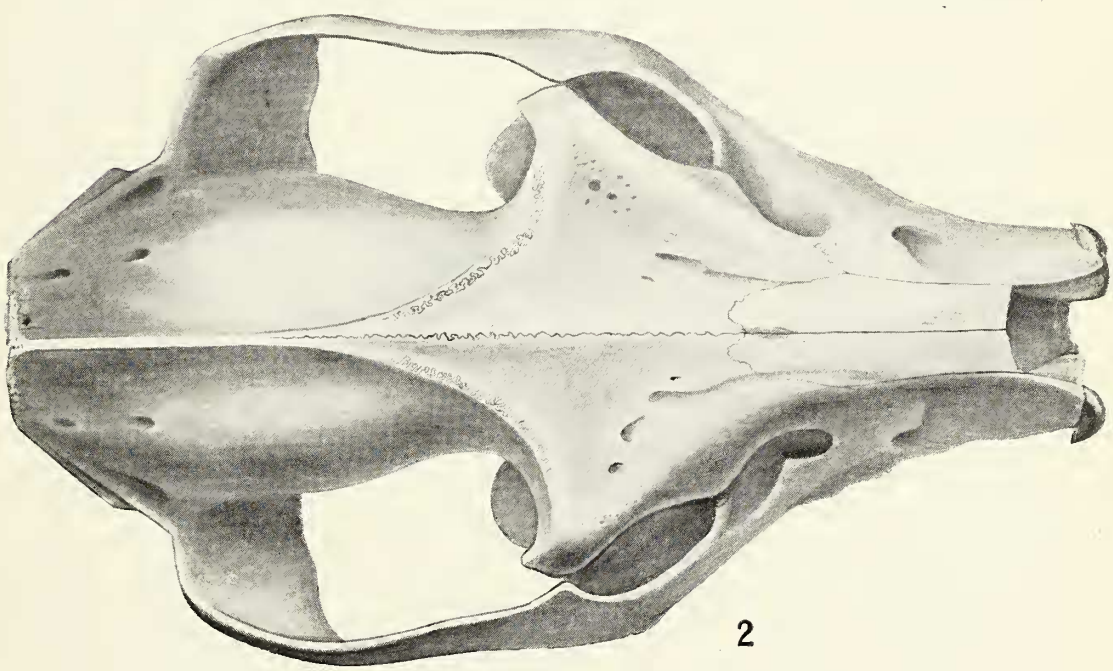

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Oreonetes anceps (Douglass).